WHAT IS CLAIMED IS:

. 1. A velocity estimator using a level crossing rate, comprising:

a power calculator for calculating power values of a signal received from a mobile 5 terminal;

a mean power calculator for calculating mean power values for M power values according to a predetermined down-sampling factor M;

an interpolator for interpolating the mean power values according to a predetermined interpolation ratio L;

a root mean square calculator for calculating a root mean square value using an output of the interpolator;

a level crossing counter for counting a level crossing frequency representing how many times the output of the interpolator crosses a level crossing threshold determined according to the root mean square value, for a predetermined time period; and

a velocity calculator for calculating a velocity estimation value of the mobile terminal using the velocity crossing frequency.

- The velocity estimator of claim 1, further comprising a down-sampling factor calculator for determining with the velocity estimation value a down-sampling factor
 M for a next time period so that an interval between Doppler spectrums of reception signal power can be minimized while no aliasing occurs, and providing the determined down-sampling factor M to the mean power calculator.
- 3. The velocity estimator of claim 2, wherein the down-sampling factor M is calculated by

$$M = \left\lceil \frac{f_s}{2f_D} \right\rceil$$

where f_s is a sampling frequency and f_D is a maximum Doppler frequency.

- 4. The velocity estimator of claim 1, wherein the interpolation ratio L is at 30 least 4.
 - 5. The velocity estimator of claim 1, wherein the level crossing counter

determines, upon occurrence of level crossing, whether a level crossing duration representing a time interval between a current level crossing time and a previous level crossing time is shorter than a predetermined value, and disregards the occurred level crossing in order not to count the level crossing frequency if the level crossing duration is shorter than the 5 predetermined value.

- 6. The velocity estimator of claim 1, wherein the level crossing threshold is set equal to the root mean square value.
- The velocity estimator of claim 1, wherein the velocity estimation value is calculated by

$$v_{LCR} = \frac{\lambda_c L_R e}{\sqrt{2\pi}}$$

where v_{LCR} is the velocity estimation value, λ_c is a wavelength of a carrier, L_R is the level crossing frequency, and e is a natural logarithm.

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- 8. A velocity estimator using a level crossing rate, comprising:
- a down-sampler for down-sampling a signal received from a mobile terminal according to a predetermined down-sampling factor M;
 - a power calculator for calculating power values of the down-sampled signal;
- an interpolator for interpolating the power values according to a predetermined interpolation ratio L;
 - a root mean square calculator for calculating a root mean square value using an output of the interpolator, wherein the root mean square value becomes a level crossing threshold;
- a level crossing counter for counting the level crossing frequency representing how many times the output of the interpolator crosses the level crossing threshold for a predetermined time period; and
 - a velocity calculator for calculating a velocity estimation value of the mobile terminal using the level crossing frequency.

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9. The velocity estimator of claim 8, further comprising a down-sampling factor calculator for determining with the velocity estimation value a down-sampling factor M for a next time period so that an interval between Doppler spectrums of reception signal

power can be minimized while no aliasing occurs, and providing the determined down-sampling factor M to the down-sampler.

10. The velocity estimator of claim 9, wherein the down-sampling factor M is 5 calculated by

$$M = \left[\frac{f_s}{2f_D}\right]$$

where f_s is a sampling frequency and f_D is a maximum Doppler frequency.

- 11. The velocity estimator of claim 8, wherein the interpolation ratio L is at 10 least 4.
- 12. The velocity estimator of claim 8, wherein the level crossing counter determines, upon occurrence of level crossing, whether a level crossing duration representing a time interval between a current level crossing time and a previous level crossing time is shorter than a predetermined value, and disregards the occurred level crossing in order not to count the level crossing frequency if the level crossing duration is shorter than the predetermined value.
- 13. The velocity estimator of claim 8, wherein the level crossing threshold is 20 set equal to the root mean square value.
 - 14. The velocity estimator of claim 8, wherein the velocity estimation value is calculated by

$$v_{LCR} = \frac{\lambda_c L_R e}{\sqrt{2\pi}}$$

- 25 where v_{LCR} is the velocity estimation value, λ_c is a wavelength of a carrier, L_R is the level crossing frequency, and e is a natural logarithm.
 - 15. A velocity estimation method using a level crossing rate, comprising the steps of:
- 30 calculating power values of a signal down-sampled with a signal received from a mobile terminal;

interpolating the power values according to a predetermined interpolation ratio; calculating a root mean square value using the interpolated values, wherein the root mean square value becomes a level crossing threshold;

counting a level crossing frequency representing how many times the interpolated 5 values cross the level crossing threshold for a predetermined time period; and

calculating a velocity estimation value of the mobile terminal using the velocity crossing frequency.

- 16. The velocity estimation method of claim 15, wherein the step of calculating power values of a down-sampled signal comprises the step of calculating power values of a signal received from the mobile terminal, and calculating mean power values for M power values according to a predetermined down-sampling factor M, wherein the mean power values become power values of the down-sampled signal.
- 15 17. The velocity estimation method of claim 15, wherein the step of calculating power values of a down-sampled signal comprises the step of down-sampling a signal received from the mobile terminal according to a predetermined down-sampling factor M, and calculating power values of the down-sampled signal.
- 20 18. The velocity estimation method of claim 15, further comprising the step of determining with the velocity estimation value a down-sampling factor M for a next time period so that an interval between Doppler spectrums of reception signal power can be minimized while no aliasing occurs.
- 25 19. The velocity estimation method of claim 15, wherein the down-sampling factor M is calculated by

$$M = \left\lceil \frac{f_s}{2f_D} \right\rceil$$

where f_s is a sampling frequency and f_D is a maximum Doppler frequency.

The velocity estimation method of claim 15, wherein the interpolation ratio L is at least 4.

- 21. The velocity estimation method of claim 15, wherein the counting step comprises the step of determining, upon occurrence of level crossing, whether a level crossing duration representing a time interval between a current level crossing time and a previous level crossing time is shorter than a predetermined value, and disregarding the occurred level crossing in order not to count the level crossing frequency if the level crossing duration is shorter than the predetermined value.
 - 22. The velocity estimation method of claim 15, wherein the level crossing threshold is set equal to the root mean square value.

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23. The velocity estimation method of claim 15, wherein the velocity estimation value is calculated by

$$v_{LCR} = \frac{\lambda_c L_R e}{\sqrt{2\pi}},$$

where v_{LCR} is the velocity estimation value, λ_c is a wavelength of a carrier, L_R is the level crossing frequency, and e is a natural logarithm.